Decision Aid to Threat Identification and Intent Modeling

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Department of Defense

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Description:
OBJECTIVE: Develop a method to monitor satellite observables using optical and other data sources to predict, and understand, future activities of operational satellites in orbit. DESCRIPTION: Determine future space activities by data mining to link disparate data together to determine patterns and trends that may be indicators of future events that might threaten our satellites. To accomplish this, determine if available data and models of human behavior are sufficient to provide a probabilistic prediction of what deviations in the data might indicate. The goal would be to develop an understanding of what observables are vailable to establish a baseline of normal space operations, what deviations are significant and how this data can be used to develop a decision aid to identify and confirm with high confidence that operations have deviated from normal behavior. It requires an assessment of what types of information may be available to feed the model, whether the information can be collected with sufficient accuracy or timeliness and whether the data can be processed quickly enough to be meaningful. Please include any requested data sources needed to accomplish the research in the proposal. Include references in proposals on how similar approaches to the proposed technique have been validated, particularly if they have been validated by the government. State-of-the-art advancements will identify potential threats several hours prior to threat event occurrence. Proposals should detail the experience in information theory, or behavior modeling and experience in validating theoretical approaches similar to the one proposed. Proposals should also include what existing data sources would be utilized. If needed, DoD High-Performance Computing resources would be available to support this research and development. PHASE I: The initial step will be to develop a logic tree of factors that can be measured and or observed that might affect standard operations of a satellite control network. The next step would be to identify potential

approaches to aggregating the individual observables into a model that might be used to assess operating modes and deviations thereto. PHASE II: Develop a model or decision aid used to interpret data sources identified in Phase I. Predict potential future satellite operations, both near term and long term if possible. Quantification and probability of generating false positives (a deviation identified when none exists) vs. false negatives (a deviation not identified) will be assessed. Measure performance against notional scenarios and timelines. PHASE III DUAL USE APPLICATIONS: Decision aids and threat identification; modeling of intent.